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How important is urban air pollution as a health hazard?

Simon Kingham

I am writing this editorial from Ashburton having been displaced from my badly damaged house in Christchurch following the earthquake of 22 Feb 2011. It is with great sadness that we are now counting the loss of life with upwards of 200 people thought to have died and a reconstruction bill that will run into the billions. In comparison, air pollution in New Zealand is estimated to result in about 1100 deaths per year and cost over \$1 billion in health-related costs.¹ These impacts of these two hazards are in many ways quite different.

Natural disaster-related hazards such as flooding, tsunamis and earthquakes have very visible impacts. The physical environment is demonstrably changed and the dead and injured can be seen and identified. The impacts of air pollution are usually quite different however. In developed countries today we rarely get short high-pollution events like those experienced in Meuse Valley in 1930, Donora in 1948, and London in 1952. Instead we get lower levels of pollution which we know have the potential to harm health. However, this means that illness and death is not immediate and not always easily attributable to specific temporal event. This fact makes the science highly contested, and is the basis for three of the papers in this issue of the *Journal*.²⁻⁴

The three Christchurch-based authors; John Hoare, Pat Palmer, and Peter Moller; are all members of the Association for Independent Research (AIR). All three, in different ways, question the effect wood smoke from domestic home heating has on health, without presenting any new primary data.

Palmer bases his assertion on the fact that the dose-response relationships appears much stronger in summer (when there is little or no wood smoke) than winter, and he concludes that wood smoke “*despite its predominance as a component in the winter PM10 may be relatively harmless*”.

Hoare suggests that the small dose-response relationship coupled with the range of other confounding factors may be leading to spurious findings, and finally Moller suggest that the 24-hour standard is inappropriate for the low levels of pollution experienced and asserts that the impacts on the ability of socioeconomic groups to heat their homes if wood use is restricted are worthy of consideration.

This goes against the broad belief that particles, whatever the source and even at low levels, are damaging to health. This is enshrined in guidelines and standards throughout the world—including the World Health Organization (WHO), the European Union, the US Environmental Protection Agency, and the New Zealand Government—which do not differentiate between the source of particles.

In relation to PM2.5 the WHO states:

...although few epidemiological studies have compared the relative toxicity of the products of fossil fuel and biomass combustion, similar effect estimates are found for a wide range of cities in both developed and developing countries. It is, therefore, reasonable to assume that the health effects of PM2.5 from both of these sources are broadly the same.⁵

Recent research has started to examine the issue of toxicity of different source particles and the findings are inconclusive with some suggesting that biomass/wood smoke does have an effect⁶ while others such as Clark et al⁷ have not identified a relationship.

More locally, another study in New Zealand has suggested that there is a possibility that vehicle emissions may have a lesser impact on health than wood smoke.⁸ This is clearly an area where further research is needed, but until it is clearly demonstrated that wood smoke does not effect health, then it would seem prudent to err on the side of caution and retain the current air quality standards that assume it does.

Current air quality standards and guidelines are limited in that they are based on a pollution value being exceeded at a fixed ambient site. In addition the vast majority of research both internationally and in New Zealand has generally used measures of pollution exposure that lack either spatial or temporal accuracy.⁹ Yet it is widely accepted that the quality of, and/or lack of, exposure data are often a weakness in studies examining links between air quality and health.

Two papers^{10,11} in this issue of the *Journal* by Nick Wilson et al attempt in a small way to address this issue; one looking at secondhand smoke in public spaces and the other at air pollution in takeaway outlets and 'barbecue' restaurants. In both cases very high short-term exposures to particulate matter were recorded. These types of exposures, along with other more frequent ones such as while travelling along roads, are not covered by air quality standards. In addition they are rarely captured in research that compares ambient pollution levels and health. Yet there is evidence that for some people time spent in these environments that can be a significant part of their daily exposure.

Pollution exposure in micro environments is something that clearly needs more attention in studies that examine the impact of the quality of the air we breathe on our health.

Competing interests: None.

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